



National Primary Drinking Water Regulations

cis- and trans-1,2-Dichloroethylene

CHEMICAL/ PHYSICAL PROPERTIES

CAS NUMBER: cis- 156-59-2
TRANS- 156-60-5

COLOR/ FORM/ODOR:
Colorless, odorless liquid

M.P.: cis- -80° C; trans- -50° C

B.P.: cis- 60.3° C; trans- 48° C

VAPOR PRESSURE:
cis- 273 mm Hg at 30° C;
trans- 395 mm Hg at 30° C

OCTANOL/WATER PARTITION (KOW):
Log Kow = cis- 1.86; TRANS- 2.06

DENSITY/SPEC. GRAV.:
cis- 1.26 at 20° C
trans- 1.28 at 20° C

SOLUBILITY: Soluble in water
cis- 3.5 g/L of water
trans- 6.3 g/L of water at 25° C

SOIL SORPTION COEFFICIENT:
Kocs of cis and trans isomers are
estimated at 36 to 49; high to very
high mobility in soil

ODOR/TASTE THRESHOLDS: N/A

HENRY'S LAW COEFFICIENT:
cis- 0.00337 atm-cu m/mole;
trans- 0.00672 atm-cu m/mole

BIOCONCENTRATION FACTOR:

BCFs of cis and trans isomers are
estimated at 15 to 22; not expected to
bioconcentrate in aquatic organisms.

TRADE NAMES/SYNONYMS:

Both isomers- 1,2-DCE, Acetylene
dichloride;
cis- Z-1,2-dichloroethene;
trans- E-1,2-dichloroethene,
sym-dichloroethylene

DRINKING WATER STANDARDS (IN MG/L)

	cis	trans
MCLG:	0.07	0.1
MCL:	0.07	0.1
HAL(child)-		
1 day:	4	20
Longer:	3	2

HEALTH EFFECTS SUMMARY

Acute: EPA has found cis- and trans- 1,2-dichloroethylene to potentially cause central nervous system depression from short-term exposures at levels above the MCL.

Short-term exposures in drinking water which are considered "safe" for a 10-kg (22 lb.) child consuming 1 liter of water per day:

cis- a one-day exposure of 4 mg/L or upto a 7-year exposure to 3 mg/L.

trans- a one-day exposure of 20 mg/L or upto a 7-year exposure to 2 mg/L.

Chronic: Both cis- and trans-1,2-DCE have the potential to cause liver, circulatory and nervous system damage from long-term exposure at levels above the MCL. The trans isomer is approximately twice as potent

as the cis- isomer in its ability to depress the central nervous system.

Cancer: There is inadequate evidence to state whether or not either cis- or trans-1,2-DCE have the potential to cause liver cancer from a lifetime exposure in drinking water.

USAGE PATTERNS

Both the cis and trans forms - usually as a mixture - are used as a solvent for waxes, resins, and acetylcellulose; in the extraction of rubber; as a refrigerant; in the manufacture of pharmaceuticals and artificial pearls and in the extraction of oils and fats from fish and meat; as a chemical intermediate for making chlorinated compounds.

No data were available on recent production levels in the United States.

RELEASE PATTERNS

Releases to the environment are expected to be limited to manufacturing plants in the Gulf Region of the United States. Since cis- and trans-1,2-DCE are not listed chemicals in the Toxics Release Inventory, data on releases during manufacture and handling are not available.

Trans-1,2-dichloroethylene may be released to the environment in air emissions and wastewater during its

production and use as a solvent and extractant, in organic synthesis, and in the manufacture of perfumes, lacquers, and thermoplastics.

An assessment of the sources of trans-1,2-dichloroethylene is complicated by the fact that it is a priority pollutant while the cis isomer is not and the standard EPA methods of analysis do not allow the isomers to be differentiated. This has resulted in monitoring reports erroneously listing the trans isomer when the cis isomer is present. The Michigan Department of Health has the capability of distinguishing these isomers and claims that it frequently finds the cis isomer and, if concentrations are high, they occasionally find traces of the trans isomer.

ENVIRONMENTAL FATE

Both the cis- and trans-1,2-dichloroethylenes may be released to the environment in air emissions and wastewater during its production and use. Under anaerobic conditions that may exist in landfills, aquifers, or sediment one is likely to find 1,2-dichloroethylenes that are formed as breakdown products from the reductive dehalogenation of common industrial solvents trichloroethylene, tetrachloroethylene, and 1,1,2,2-tetrachloroethane.

The cis-1,2-dichloroethylene is apparently the more common isomer found although it is mistakenly reported as the trans isomer. The trans-isomer, being a priority pollutant, is more commonly analyzed for and the analytical procedures generally used do not distinguish between isomers.

If 1,2-dichloroethylenes are released on soil, it should evaporate and leach into the groundwater where very slow biodegradation should occur.

If released into water, 1,2-dichloroethylenes will be lost mainly through volatilization.

In the atmosphere, 1,2-dichloroethylenes will be lost by reaction with photochemically produced hydroxyl radicals and scavenged by rain. Because it is relatively long-lived in the atmosphere, considerable dispersal from source areas should occur.

Biodegradation, adsorption to sediment, and bioconcentration in aquatic organisms should not be significant.

OTHER REGULATORY INFORMATION

MONITORING:

FOR GROUND/SURFACE WATER SOURCES:

INITIAL FREQUENCY- 4 quarterly samples every 3 years

REPEAT FREQUENCY- Annually after 1 year of no detection

TRIGGERS - Return to Initial Freq. if detect at > 0.0005 mg/L

ANALYSIS:

REFERENCE SOURCE

EPA 600/4-88-039

METHOD NUMBERS

502.2; 524.2

TREATMENT:

BEST AVAILABLE TECHNOLOGIES

Granular Activated Charcoal and Packed Tower Aeration

FOR ADDITIONAL INFORMATION:

♦ EPA can provide further regulatory and other general information:

• EPA Safe Drinking Water Hotline - 800/426-4791

♦ Other sources of toxicological and environmental fate data include:

• Toxic Substance Control Act Information Line - 202/554-1404

• Toxics Release Inventory, National Library of Medicine - 301/496-6531

• Agency for Toxic Substances and Disease Registry - 404/639-6000